

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-42

**Name:** Brant Lake

**County:** Lake

**Legal Description:** T105N- R51W-Sec. 3, 4, 9, 10

**Location from nearest town:** 2 miles north of Chester, SD

**Dates of present survey:** July 20-22, 2009 (netting); Sept. 1, 2009 (electrofishing)

**Dates of last survey:** July 21-23, 2008 (netting); Sept. 4, 2008 (electrofishing)

Primary Game Species	Other Species
Walleye	Northern Pike
Smallmouth Bass	Bluegill
Yellow Perch	Black Bullhead
Black Crappie	Channel Catfish
	Bigmouth Buffalo
	Common Carp
	White Sucker
	Spottail Shiner
	Green Sunfish
	Hybrid Sunfish
	White Bass

## PHYSICAL DATA

**Surface area:** 1,037 acres

**Maximum depth:** 14 feet

**Volume:** 11,000 acre-feet

**Contour map available:** Yes

**OHWM elevation:** 1598.3

**Outlet elevation:** 1597.3

**Lake elevation observed during the survey:** Full

**Beneficial use classifications:** (4) warmwater permanent fish life propagation, (7) immersion recreation, (8) limited contact recreation and (9) wildlife propagation and stock watering.

**Watershed area:** 7,658 acres

**Mean depth:** 11 feet

**Shoreline length:** 6.2 miles

**Date mapped:** November, 2002

**Date set:** December, 1981

**Date set:** February, 1987

## **Introduction**

Brant Lake, located just north of Chester, is fourth in a chain of four natural lakes formed by receding glaciers at the end of the last ice age. It derived its name from the large number of white brant (snow geese) that occupy the area during the spring and fall migrations. Brant receives most of its water from lakes Herman, Madison and Round, the upper three lakes in the chain, via Silver Creek. Additional inputs come from the relatively small, local watershed. Outflows form the headwaters of Skunk Creek, which flows into the Big Sioux River in Sioux Falls.

## **Ownership of Lake and Adjacent Lakeshore Properties**

Brant Lake is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. GFP also owns and maintains access areas on the east, south, and west sides of the lake. The remainder of the shoreline property is privately owned.

## **Fishing Access**

The East Brant Access Area has a double lane boat ramp, dock and large parking lot. The West Brant Access Area has a new double lane boat ramp with a large parking lot and several shore fishing areas. The South Brant Access Area also offers shore fishing opportunities.

## **Field Observations of Water Quality and Aquatic Vegetation:**

In spite of a moderate algae bloom, water clarity was good this year with a Secchi depth measurement of 1.8 m (72 in). Scattered, sparse beds of sago pondweed (*Potamogeton pectinatus*) were found throughout the lake and cattails (*Typha spp.*) were observed at the west end.

## **BIOLOGICAL DATA**

### **Methods:**

Brant Lake was sampled on July 20-22, 2009 with five overnight gill-net sets and 12 overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh ( $\frac{3}{4}$  in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ( $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ , and 2 in) monofilament netting. Two hours of nighttime electrofishing were done on September 1, 2009 to evaluate walleye recruitment. Sampling locations are displayed in Figure 8.

### **Results and Discussion:**

### **Gill Net Catch**

Yellow perch (29.5%), walleye (17.6%), and white bass (17.6%) were the most abundant species sampled in the gill nets (Table 1). Eleven additional species were also sampled. Six species were represented by only one individual.

**Table 1.** Total catch from five overnight gill-net sets at Brant Lake, Lake County July 20-22, 2009.

Species	#	%	CPUE <sup>1</sup>	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Yellow Perch	62	29.5	12.4	<u>+4.8</u>	41.9	87	11	103
Walleye	37	17.6	7.4	<u>+3.0</u>	15.7	13	6	81
White Bass	37	17.6	7.4	<u>+4.8</u>	1.1	100	51	92
Black Bullhead	24	11.4	4.8	<u>+2.6</u>	6.1	83	0	101
Bigmouth Buffalo	20	9.5	4.0	<u>+4.2</u>	2.7	100	0	91
White Sucker	17	8.1	3.4	<u>+2.1</u>	7.0	100	94	101
Black Crappie	5	2.4	1.0	<u>+0.6</u>	2.4	--	--	--
Spottail Shiner	2	1.0	0.4	<u>+0.3</u>	0.5	--	--	--
Bluegill	1	0.5	0.2	<u>+0.3</u>	0.6	--	--	--
Channel Catfish	1	0.5	0.2	<u>+0.3</u>	0.6	--	--	--
Common Carp	1	0.5	0.2	<u>+0.3</u>	1.2	--	--	--
Green Sunfish	1	0.5	0.2	<u>+0.3</u>	0.0	--	--	--
Northern Pike	1	0.5	0.2	<u>+0.3</u>	0.6	--	--	--
Smallmouth Bass	1	0.5	0.2	<u>+0.3</u>	5.3	--	--	--

\* (10 years) 1998-2007

**Table 2.** Catch per unit effort by length category for various fish species captured with gill nets in Brant Lake July 20-22, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Yellow Perch	--	12.4	1.6	9.4	1.4	12.4	<u>+4.8</u>
Walleye	1.2	6.2	5.4	0.4	0.4	7.4	<u>+3.0</u>
White Bass	--	7.4	--	3.6	3.8	7.4	<u>+4.8</u>
Black Bullhead	--	4.8	0.8	4.0	--	4.8	<u>+2.6</u>
Bigmouth Buffalo	--	4.0	--	4.0	--	4.0	<u>+4.2</u>
White Sucker	--	3.4	--	0.2	3.2	3.4	<u>+2.1</u>
Black Crappie	--	1.0	0.2	0.4	0.4	1.0	<u>+0.6</u>
Spottail Shiner*	--	--	--	--	--	0.4	<u>+0.3</u>
Bluegill	--	0.2	--	--	0.2	0.2	<u>+0.3</u>
Channel Catfish	--	0.2	--	--	0.2	0.2	<u>+0.3</u>
Common Carp	0.2	--	--	--	--	0.2	<u>+0.3</u>
Green Sunfish	--	0.2	0.2	--	--	0.2	<u>+0.3</u>
Northern Pike	--	0.2	--	0.2	--	0.2	<u>+0.3</u>
Smallmouth Bass	--	0.2	0.2	--	--	0.2	<u>+0.3</u>

\*No length categories established. Length categories can be found in Appendix A.

## **Trap Net Catch**

Black bullhead (32.1%) was the most abundant species in the trap-net catch (Table 3). Bigmouth buffalo (20.0%) and black crappie (17.7%) were next in abundance. Eight other species were also sampled.

<sup>1</sup> See Appendix A for definitions of CPUE, PSD, RSD-P, and mean Wr.

**Table 3.** Total catch from 12 overnight trap-net sets at Brant Lake, Lake County July 20-22, 2009.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	125	32.1	10.4	<u>+3.7</u>	23.8	96	18	99
Bigmouth Buffalo	78	20.0	6.5	<u>+3.1</u>	4.2	96	6	90
Black Crappie	69	17.7	5.8	<u>+1.2</u>	8.8	93	22	105
Common Carp	31	7.9	2.6	<u>+1.8</u>	5.4	100	16	97
Bluegill	23	5.9	1.9	<u>+0.7</u>	5.0	100	74	116
Smallmouth Bass	23	5.9	1.9	<u>+0.7</u>	14.9	26	4	88
White Sucker	18	4.6	1.5	<u>+0.8</u>	7.3	100	100	100
Northern Pike	8	2.1	0.7	<u>+0.4</u>	1.0	--	--	--
Walleye	6	1.5	0.5	<u>+0.2</u>	15.7	--	--	--
Yellow Perch	6	1.5	0.5	<u>+0.4</u>	4.3	--	--	--
White Bass	3	0.8	0.3	<u>+0.2</u>	0.2	--	--	--

\* (10 years) 1999-2008

**Table 4.** Catch per unit effort by length category for various fish species captured with trap nets in Brant Lake July 20-22, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black Bullhead	--	10.4	0.4	8.1	1.9	10.4	<u>+3.7</u>
Bigmouth Buffalo	--	6.5	0.3	5.8	0.4	6.5	<u>+3.1</u>
Black Crappie	--	5.8	0.4	4.1	1.3	5.8	<u>+1.2</u>
Common Carp	--	2.6	--	2.2	0.4	2.6	<u>+1.8</u>
Bluegill	--	1.9	--	0.5	1.4	1.9	<u>+0.7</u>
Smallmouth Bass	--	1.9	1.4	0.4	0.1	1.9	<u>+0.7</u>
White Sucker	--	1.5	--	--	1.5	1.5	<u>+0.8</u>
Northern Pike	0.3	0.4	0.2	0.1	0.1	0.7	<u>+0.4</u>
Walleye	--	0.5	0.2	--	0.3	0.5	<u>+0.2</u>
Yellow Perch	--	0.5	--	0.4	0.1	0.5	<u>+0.4</u>
White Bass	--	0.3	0.1	--	0.2	0.3	<u>+0.2</u>

## Walleye

**Management objective:** Maintain a walleye population with a gill-net CPUE of at least 20, a PSD range of 30-60, and a growth rate of 356 mm (14 inches) by age-3.

Walleye gill-net CPUE declined to the lowest seen since 1992 and remains well below the management objective (Table 5). Most of the walleye sampled were naturally produced in 2007 (Table 6). Growth rates were average and condition (Wr) was below the ten-year mean (Table 5).

**Table 5.** Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for Brant Lake, Lake County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	21.3	20.5	20.7	12.8	12.3	8.5	12.5	20.0	9.2	7.4	15.7
PSD	9	38	82	13	4	59	44	28	16	13	31
RSD-P	0	4	0	6	2	0	5	13	7	6	4
Mean Wr	89	93	83	81	86	84	85	86	83	81	85

\*10 years (1999-2008)

**Table 6.** Weighted mean length at capture (mm) for walleye captured in gill nets in Brant Lake, Lake County, 2003-2009. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2009 (37)	220 (6)	301 (25)	389 (4)	--	--	572 (1)	--	--	--	727 (1)	--	--
2008 (55)	243 (18)	332 (30)	419 (3)	--	--	--	535 (1)	--	644 (2)	--	485 (1)	--
2007 (80)	241 (40)	343 (25)	379 (3)	453 (3)	478 (3)	545 (1)	611 (3)	686 (2)	--	--	--	--
2006 (50)	258 (26)	257 (2)	394 (6)	417 (7)	442 (6)	478 (1)	500 (1)	--	692 (1)	--	--	--
2005 (34)	--	363 (12)	391 (10)	415 (12)	--	--	--	--	--	--	--	--
2004 (49)	258 (14)	303 (9)	331 (25)	--	--	532 (1)	--	--	--	--	--	--
2003 (64)	221 (8)	271 (46)	330 (3)	429 (1)	500 (2)	503 (1)	542 (1)	562 (2)	--	--	--	--

Walleye fingerling stocking produced a strong year class in 2009 (Table 7). Oxytetracycline (OTC) marks were bright, easy to detect and present on 84% of the 50 fish examined (Table 7). Size of age-0 walleyes was similar to other years and condition improved from 2008, but was still lower than average for the last 10 years. Yearling CPH was higher than expected based on the low numbers of age-0 walleyes sampled in 2008. Migration of young walleyes from Lake Madison may have helped increase the abundance of age-1 fish in Brant but we have no way of validating this. The size and condition of age-1 walleyes was similar to past years.

**Table 7.** Age-0 and age-1 walleyes sampled during 2 hours of nighttime electrofishing on Brant Lake, Lake County, 1996-2009.

Year	Stocking	Age-0 CPH	80% C.I.	% stocked	Mean length (range; mm)	Wr	Age-1 CPH	80% C.I.	Mean length (range; mm)	Wr
2009	fingerling	111	82-140	84	151 (129-170)	87	11	3-19	274 (234-300)	86
2008	none	3	1-5		165 (152-186)	82	39	24-54	264 (228-297)	86
2007	none	40	22-68		188 (156-212)	93	9	5-13	290 (252-310)	89
2006	fingerling	124	98-150	73	170 (136-188)	90	11	4-18	290 (255-324)	88
2005	fry	62 <sup>1</sup>	51-73	45	174 (138-209)	94	0	--	--	--
2004	none	0	--		--	--	2	0-3	266 (236-288)	89
2003	none	20	14-26		176 (156-181)	101	8	6-10	265 (228-274)	89
2002	none	42	21-63		164 (140-183)	98	166	112-219	248 (208-268)	86
2001	none	84	49-118		154 (131-198)	86	1	0-2	319	
2000	none	24	18-30		184 (161-217)	101	5	3-7	295 (269-305)	101
1999	none	86			162 (140-217)		35			
1998	fry	176		98	137 (116-132)		23			
1997	fry	178		93	124 (102-190)		58			
1996	fry	79		92	137 (116-186)		34			

<sup>1</sup> OTC marking revealed that 50% of the age-0 walleyes electrofished from Brant Lake were 2005 fingerling-stocked Lake Madison walleyes that had migrated downstream with the late-summer, high-water conditions (fish exhibited bright fingerling marks).

## Yellow Perch

**Management objective:** Maintain a yellow perch population with a gill-net CPUE of at least 30 and a PSD range of 30-60.

Yellow perch gill-net CPUE remained below the management objective (Table 8). However, the size structure of the population is excellent (Figure 2), the fish are in very good condition (Table 8) and growth remains within the range observed previously (Table 9). Some natural reproduction is occurring annually, but a strong year class has not been produced since 2001. OTC-marked yellow perch fingerlings (103,540) were stocked in July 2008 and over five million yellow perch fry were stocked in 2009. Evaluation of these stockings is ongoing.

**Table 8.** Yellow perch gill-net CPUE, PSD, and mean Wr for Brant Lake, Lake County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	28.0	42.8	124.7	76.6	50.0	28.3	18.0	4.0	15.0	12.4	41.9
PSD	82	8	93	94	98	63	60	56	47	87	67
RSD-P	28	0	3	15	86	53	39	13	34	11	30
Mean Wr	106	93	99	101	102	102	103	104	104	103	101

\*10 years (1999-2008)

**Table 9.** Weighted mean length at capture (mm) for yellow perch captured in gill nets in Brant Lake, Lake County, 2003-2009. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8
2009 (61)	161 (2)	220 (53)	270 (3)	303 (3)	--	--	--	--
2008 (90)	150 (45)	228 (16)	276 (27)	240 (2)	--	--	--	--
2007 (16)	167 (4)	199 (6)	248 (6)	--	--	--	--	--
2006 (72)	180 (32)	238 (10)	259 (7)	262 (1)	291 (18)	295 (4)	--	--
2005 (107)	164 (38)	239 (9)	243 (3)	276 (42)	280 (15)	--	--	--
2004 (200)	164 (4)	221 (2)	262 (188)	260 (6)	--	--	--	--
2003 (383)	--	225 (205)	231 (130)	242 (32)	274 (12)	272 (4)	--	--

## **Smallmouth Bass**

**Management objective:** No management objective has been established.

Smallmouth bass trap-net CPUE decreased again this year and is now the lowest in 10-years (Table 10). Smallmouth bass populations are not known to be cyclic in South Dakota however, the Brant population seems to fluctuate considerably. This may be due to netting variability, weather, habitat conditions, variable recruitment, and changes in the fish community (predators or competition). This year's sample was comprised of fish ranging from 19-35 cm (7.5-13.8 in) long (Figure 3), and an average length of 26 cm (10.2 in). Condition (Wr) was below average (Table 10).

**Table 10.** Smallmouth bass trap-net CPUE, PSD, RSD-P, and mean Wr from Brant Lake, Lake County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	4.2	14.0	22.0	5.0	8.7	2.6	51.5	17.4	4.3	1.9	14.9
PSD	10	35	5	6	19	42	10	10	39	26	18
RSD-P	2	8	0	0	1	17	5	3	4	4	4
Mean Wr	107	103	118	94	103	102	93	98	85	88	100

\*10 years (1999-2008)

## **Black Crappie**

**Management objective:** Maintain a black crappie population with a trap-net CPUE of at least 10 and a PSD of at least 60.

Black crappie trap-net CPUE decreased slightly in 2009 and is below the 10-year mean (Table 11). The crappies sampled were 18-33 cm (7.1-13.0 in) long (Figure 4) with an average length of 228 mm (9.0 in). The length-frequency histograms in Figure 4 show several year classes with a good size structure and the fish are in excellent condition (Table 11).

**Table 11.** Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr from Brant Lake, Lake County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	4.3	8.1	11.8	23.2	3.9	8.8	9.8	5.8	7.6	5.8	8.8
PSD	100	97	81	100	100	35	76	94	89	93	83
RSD-P	35	23	0	25	98	26	32	21	40	22	31
Mean Wr	114	121	113	104	99	116	110	109	104	105	111

\*10 years (1999-2008)

## **All Species**

White sucker, common carp, bluegill, smallmouth bass, and walleye CPUE declined this year, (Table 12). CPUE for all other species was within previously observed ranges.

**Table 12.** Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Brant Lake, Lake County, 2000-2009.

<b>Species</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>SPS (GN)</b>	0.8	0.3	2.3	--	0.3	--	0.8	--	0.8	0.4
<b>SPS (TN)</b>	--	--	--	--	--	--	--	--	--	--
<b>COC (GN)</b>	1.5	0.5	--	1.2	0.3	2.5	0.3	2.5	1.0	0.2
<b>COC (TN)</b>	4.1	1.2	7.7	2.2	17.8	4.8	3.5	6.2	3.4	2.6
<b>WHS (GN)</b>	3.2	6.0	4.3	10.6	17.0	8.5	8.8	5.5	4.2	3.4
<b>WHS (TN)</b>	0.6	2.6	5.1	3.5	4.5	45.1	7.1	0.8	0.2	1.5
<b>BIB (GN)</b>	--	--	--	0.2	--	3.3	19.3	3.5	1.0	4.0
<b>BIB (TN)</b>	0.2	1.8	3.9	1.5	0.2	0.3	22.0	3.0	7.8	6.5
<b>BLB (GN)</b>	1.5	0.5	6.0	17.2	5.0	9.0	12.5	2.0	4.5	4.8
<b>BLB (TN)</b>	3.1	6.0	15.0	147.5	11.3	9.1	27.0	4.8	11.9	10.4
<b>CCF (GN)</b>	0.3	--	--	1.2	1.5	2.0	--	--	0.2	0.2
<b>CCF (TN)</b>	0.1	--	--	2.6	0.6	0.3	0.5	1.1	0.3	--
<b>NOP (GN)</b>	0.5	0.3	1.0	--	0.8	0.3	0.8	1.3	1.0	0.2
<b>NOP (TN)</b>	0.3	0.6	2.1	0.5	0.7	--	0.7	0.9	2.0	0.7
<b>WHB (GN)</b>	--	--	--	--	--	0.5	--	0.3	10.5	7.4
<b>WHB (TN)</b>	--	0.1	--	--	0.1	--	--	--	1.6	0.3
<b>GSF (GN)</b>	--	--	--	0.2	--	--	--	--	--	0.2
<b>GSF (TN)</b>	--	0.1	0.1	--	0.3	--	0.1	--	--	--
<b>HYB (GN)</b>	--	--	--	0.4	--	--	--	--	--	--
<b>HYB (TN)</b>	--	0.7	0.5	0.5	--	--	--	--	0.1	--
<b>BLG (GN)</b>	--	0.3	1.3	0.6	--	0.3	1.3	0.8	1.3	0.2
<b>BLG (TN)</b>	1.3	3.3	8.8	4.4	4.1	6.8	6.9	4.6	9.4	1.9
<b>SMB (GN)</b>	1.3	3.3	7.0	4.4	3.8	3.5	16.3	8.5	2.2	0.2
<b>SMB (TN)</b>	4.2	14.0	22.2	5.0	8.7	2.6	51.5	17.4	4.3	1.9
<b>BLC (GN)</b>	0.7	--	7.7	3.0	2.8	5.3	2.0	0.5	1.8	1.0
<b>BLC (TN)</b>	4.3	8.1	11.8	23.2	3.9	8.8	9.8	5.8	7.6	5.8
<b>YEP (GN)</b>	28.0	42.8	124.7	76.6	50.0	28.3	18.0	4.0	15.0	12.4
<b>YEP (TN)</b>	5.4	17.7	8.5	8.3	0.7	0.2	0.7	0.2	0.3	0.5
<b>WAE (GN)</b>	21.3	20.5	20.7	12.8	12.0	8.5	12.5	20.0	9.2	7.4
<b>WAE (TN)</b>	0.5	3.2	1.5	2.0	2.3	1.1	1.6	0.8	0.9	0.5

SPS (Spottail Shiner), COC (Common Carp), WHS (White Sucker), BIB (Bigmouth Buffalo), BLB (Black Bullhead), CCF (Channel Catfish), NOP (Northern Pike), WHB (White Bass), GSF (Green Sunfish), HYB (Hybrid Sunfish), BLG (Bluegill), SMB (Smallmouth Bass), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye)

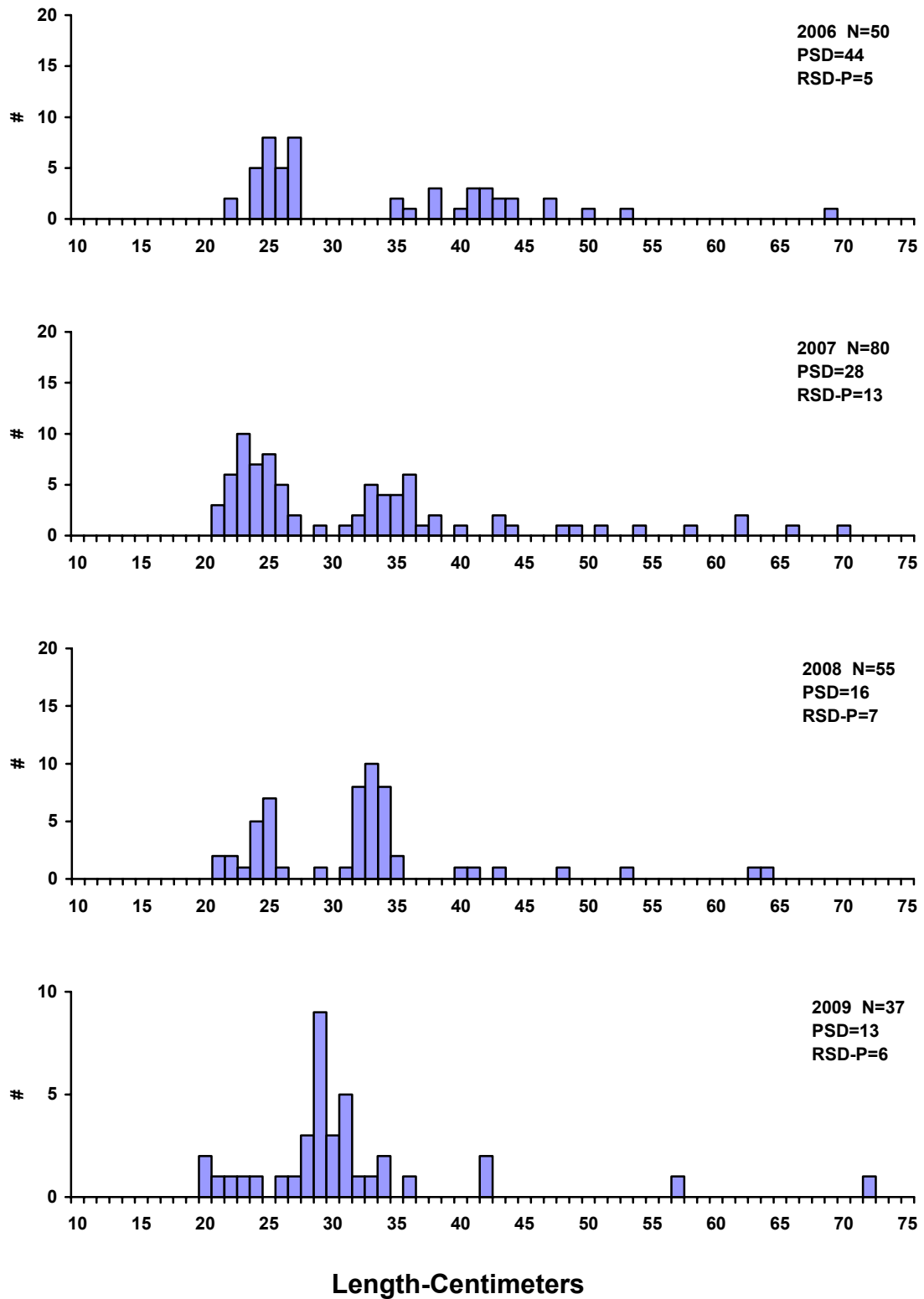


## **MANAGEMENT RECOMMENDATIONS**

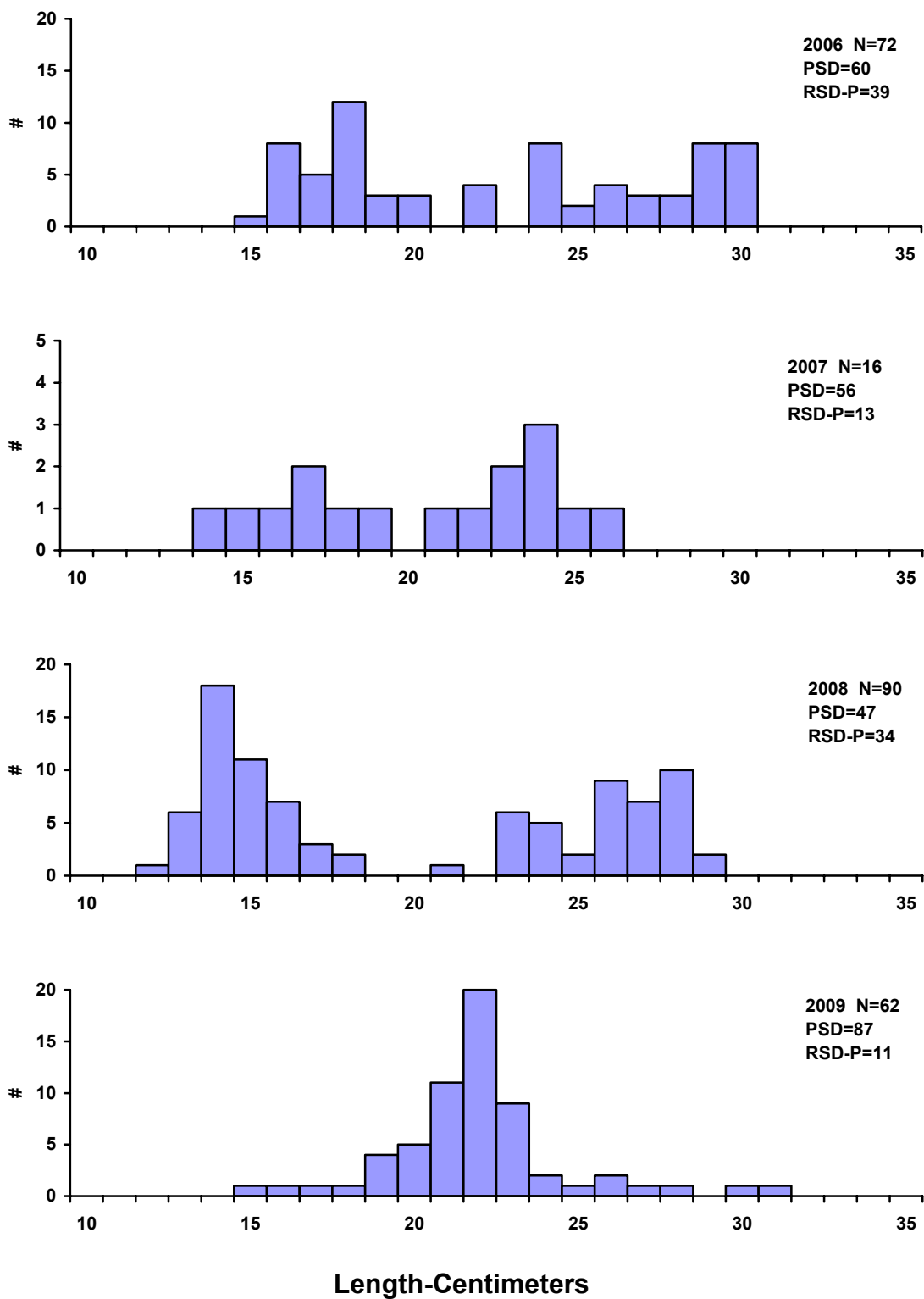
1. Continue annual netting surveys to monitor the general fish population and annual fall electrofishing surveys to monitor walleye recruitment and smallmouth bass populations.
2. Maintain the walleye population by stocking fry or fingerlings when natural reproduction is insufficient to maintain abundance.
3. Consider yellow perch stocking and spawning habitat enhancement to fill voids of poor reproduction. Develop hatchery production methods to provide large numbers of yellow perch fry and fingerlings for stocking. Fry and fingerling perch should be marked with OTC prior to release. Marked fish will be monitored through annual lake surveys.
4. Adult crappie stockings have been ineffective and were discontinued. Past research has indicated that a lack of wind protected spawning habitat may limit natural reproduction. Investigate the use of artificial structures to enhance spawning habitat and the use of barriers to protect crappie spawning areas from the destructive activities of common carp.
5. The Brant Lake Association has expressed interest in cooperating with GFP to work on habitat projects in the lake. We should develop a preliminary habitat improvement plan that includes Christmas trees for perch spawning and shoreline brush piles for crappie, bass and bluegill benefits.
6. Consider using barriers to keep common carp away from their preferred spawning habitat to limit reproduction and control the carp population.

**Table 13.** Stocking record for Brant Lake, Lake County, 1997-2009.

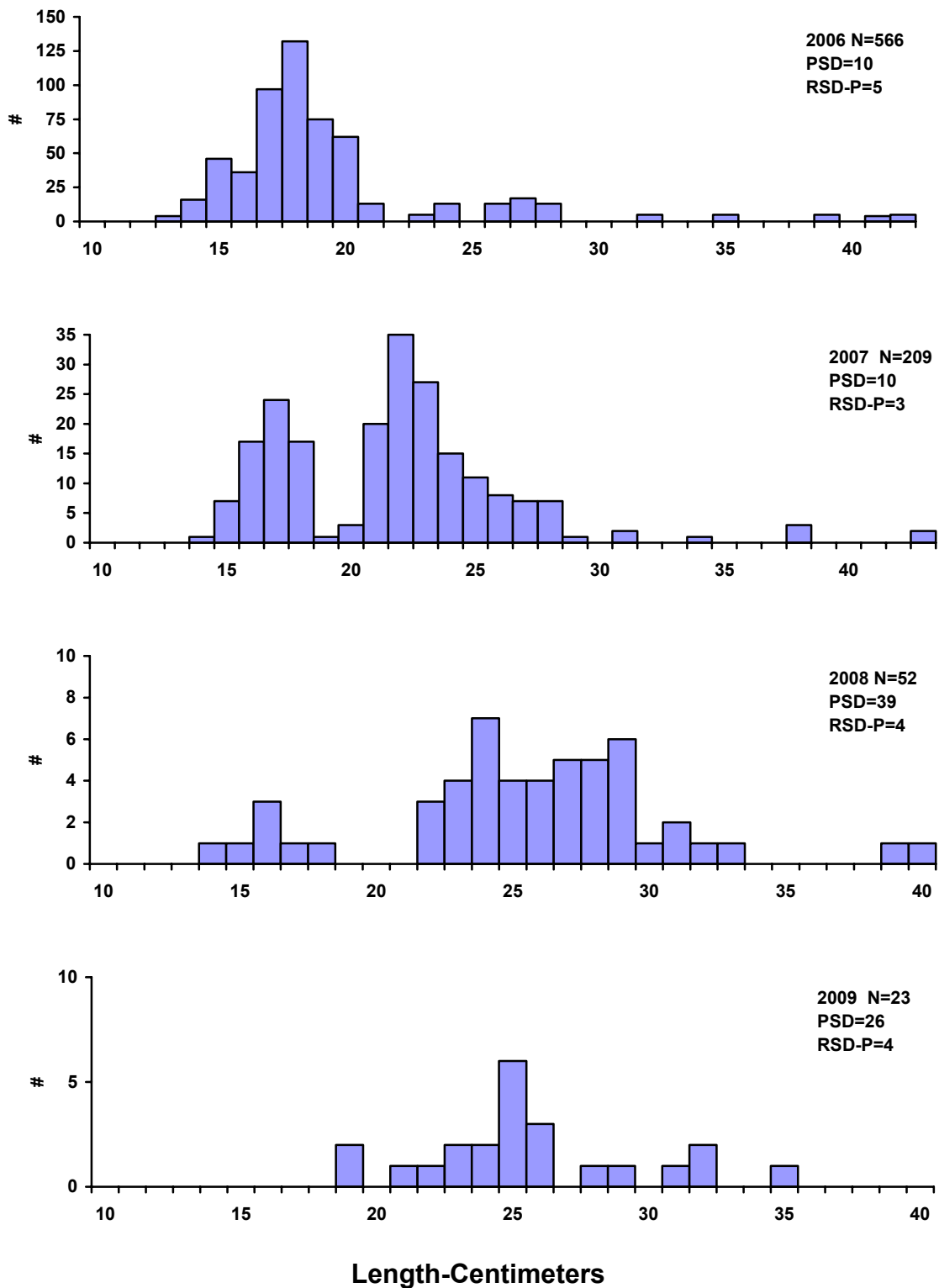
<b>Year</b>	<b>Number</b>	<b>Species</b>	<b>Size</b>
1997	1,620	Black Crappie	Adult
	98,700	Bluegill	Fingerling
	1,974,000	Walleye	Fry
	4,024	Yellow Perch	Adult
1998	1,974,000	Walleye	Fry
1999	12,089	Black Crappie	Juvenile
	20,528	Yellow Perch	Juvenile
	8,225	Yellow Perch	Adult
2000	47,044	Yellow Perch	Juvenile
2001	8,992	Yellow Perch	Adult
2002	16,929	Yellow Perch	Juvenile
	700	Yellow Perch	Adult
2004	6,885	Yellow Perch	Fingerling
2005	385,950	Walleye	Fry
2006	104,910	Walleye	Sml. Fingerling
	3,582	Yellow Perch	Fingerling
2007	30,825	Yellow Perch	Fingerling
	4,000	Fathead Minnow	Adult
2008	103,540	Yellow Perch	Fingerling
2009	103,900	Walleye	Sml. Fingerling
	5,254,000	Yellow Perch	Fry



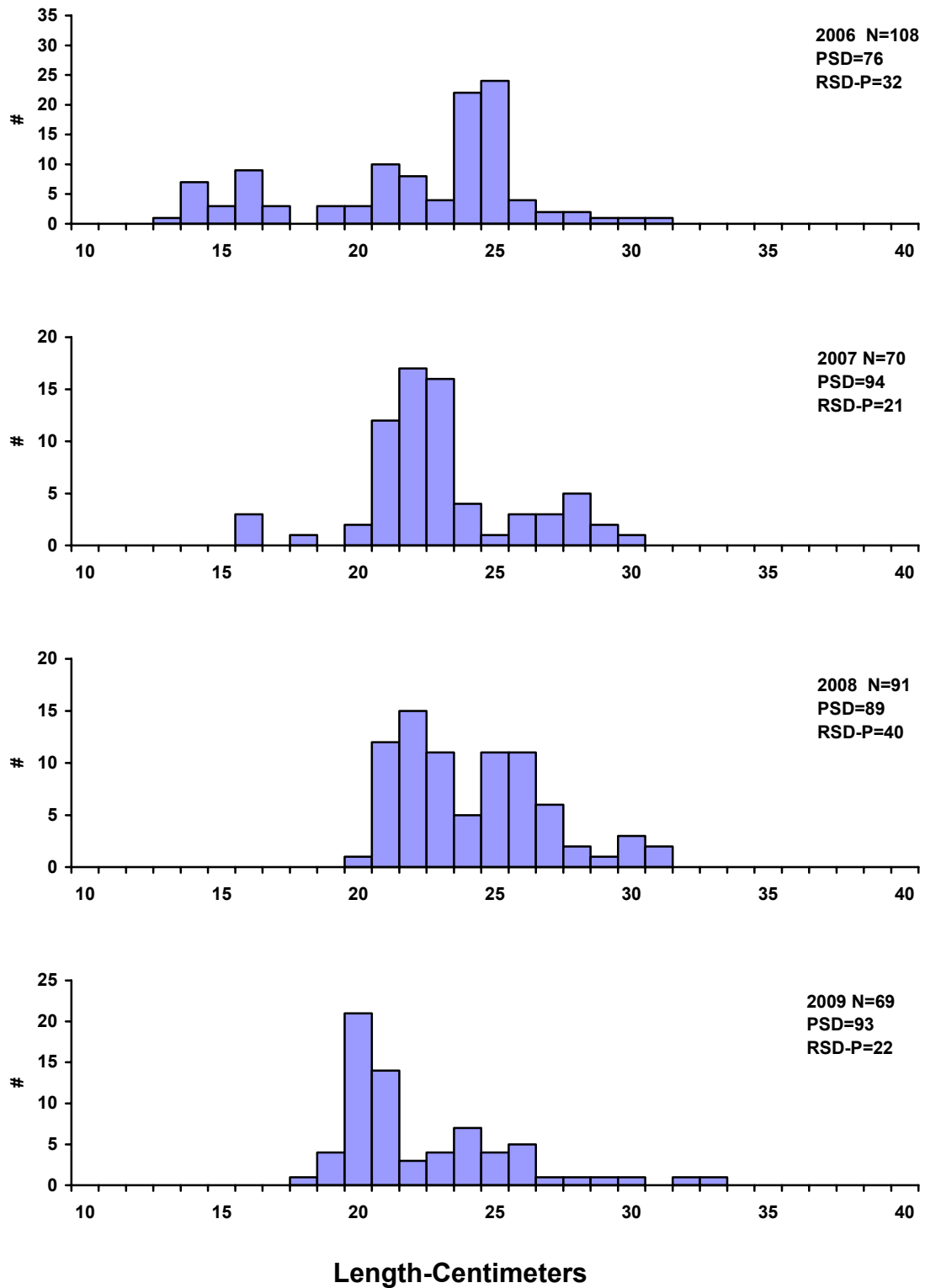
**Figure 1.** Length frequency histograms for walleyes sampled with gill nets in Brant Lake, Lake County, 2006-2009.



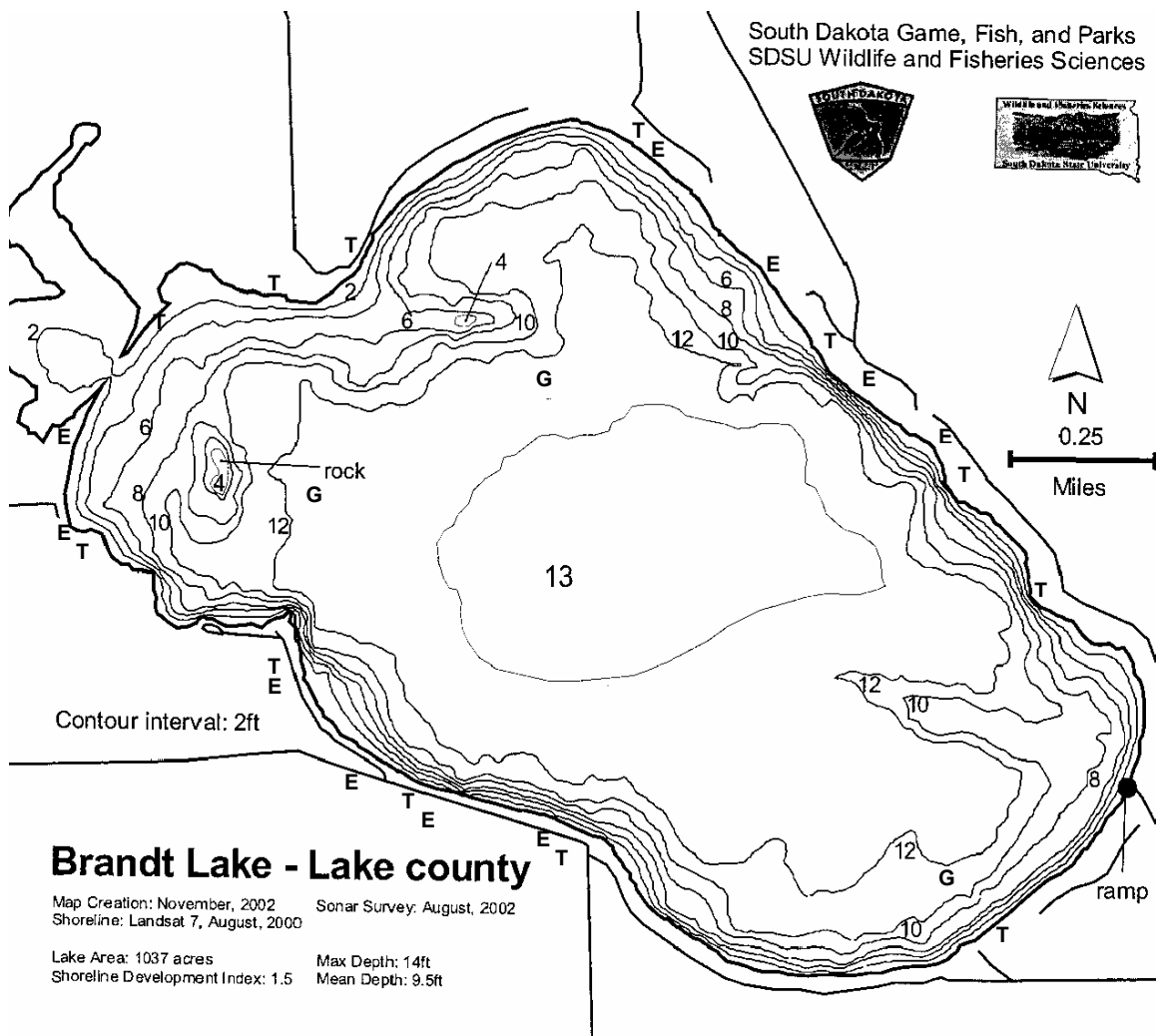
**Figure 2.** Length frequency histograms for yellow perch sampled in gill nets in Brant Lake, Lake County, 2006-2009.



**Figure 3.** Length frequency histograms for smallmouth bass sampled with trap nets from Brant Lake, Lake County, 2006-2009.



**Figure 4.** Length frequency histograms for black crappies sampled with trap nets in Brant Lake, Lake County, 2006-2009.



**Figure 5.** Sampling locations on Brant Lake, Lake County, 2009.

**Appendix A.** A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

**Catch Per Unit Effort (CPUE)** is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

**Proportional Stock Density (PSD)** is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

**Relative Stock Density (RSD-P)** is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

**Relative weight (Wr)** is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.